

Supplementary Data

Supplementary Table 1: Functional connectivity statistics for all metrics and frequency bands. Table elements are p-values for designated statistic. One-way ANOVAs were conducted with post-hoc pairwise t-tests using Tukey-Kramer multiple comparison correction.

Statistic	Delta	Theta	Alpha	Beta	Low Gamma	High Gamma
Imaginary Coherence						
ANOVA	2.87E-06**	3.66E-02	2.13E-03*	9.48E-12***	2.04E-08**	7.05E-01
SOZ-PZ	9.45E-01	9.99E-01	9.95E-01	8.14E-01	1.64E-01	7.42E-01
SOZ-NIZ	3.71E-05*	5.93E-02	6.40E-03	2.05E-11***	4.33E-09***	7.60E-01
PZ-NIZ	1.43E-05*	7.40E-02	6.06E-03	4.13E-09***	1.42E-04*	9.99E-01
Real Coherence						
ANOVA	4.05E-03*	1.53E-01	4.01E-02	2.14E-06**	3.05E-04*	4.89E-03*
SOZ-PZ	1.00E+00	9.77E-01	9.32E-01	3.10E-01	7.10E-01	9.98E-01
SOZ-NIZ	9.04E-03	1.73E-01	4.54E-02	9.08E-07**	2.92E-04*	1.02E-02
PZ-NIZ	1.26E-02	2.75E-01	1.22E-01	1.26E-03	7.69E-03	1.53E-02
Partial Directed Coherence: Inward Strength						
ANOVA	1.74E-12***	1.68E-12***	1.75E-12***	9.80E-13***	1.16E-12***	4.72E-13***
SOZ-PZ	1.30E-05*	2.75E-05*	4.29E-05*	1.31E-05*	1.02E-05*	3.12E-06**
SOZ-NIZ	2.03E-14***	1.63E-14***	1.59E-14***	8.84E-15***	1.21E-14***	4.46E-15***
PZ-NIZ	9.11E-03	4.98E-03*	3.54E-03*	6.63E-03	8.79E-03	1.29E-02
Partial Directed Coherence: Outward Strength						
ANOVA	7.26E-07**	1.10E-08**	4.95E-10***	1.40E-09***	6.61E-08**	3.23E-10***
SOZ-PZ	9.68E-04	1.17E-03*	7.05E-04*	1.09E-03*	1.36E-03*	1.01E-04*
SOZ-NIZ	2.33E-07**	1.00E-09***	3.26E-15***	7.45E-11***	9.46E-09**	1.72E-11***
PZ-NIZ	2.34E-01	2.80E-02	1.33E-04*	9.70E-03	6.22E-02	2.99E-02
Partial Directed Coherence: Inward - Outward Strength						
ANOVA	6.04E-12***	9.63E-13***	3.13E-13***	1.87E-13***	1.86E-12***	2.93E-13***
SOZ-PZ	1.19E-05*	2.29E-05*	2.64E-05*	1.02E-05*	1.30E-05*	2.85E-06**
SOZ-NIZ	1.24E-13***	7.63E-15***	7.50E-07**	8.35E-16***	2.24E-14***	2.24E-15***
PZ-NIZ	1.86E-02	4.22E-03*	5.81E-04*	3.22E-03*	9.42E-03	1.07E-02

* P < 5e-3, ** P < 5e-6, *** P < 5e-9 (more conservative than the supplementary figure thresholds: * P < 0.05, ** P < 5e-3, *** P < 5e-6)

ImCoh: imaginary coherence, ReCoh: real coherence, PDC: partial directed connectivity, SOZ: seizure onset zone, PZ: propagation zone, NIZ: non-involved zone. Delta (1-3 Hz), Theta (4-7 Hz), Alpha (8-12 Hz), Beta (13-30 Hz), Low Gamma (31-80 Hz), High Gamma (81-150 Hz).

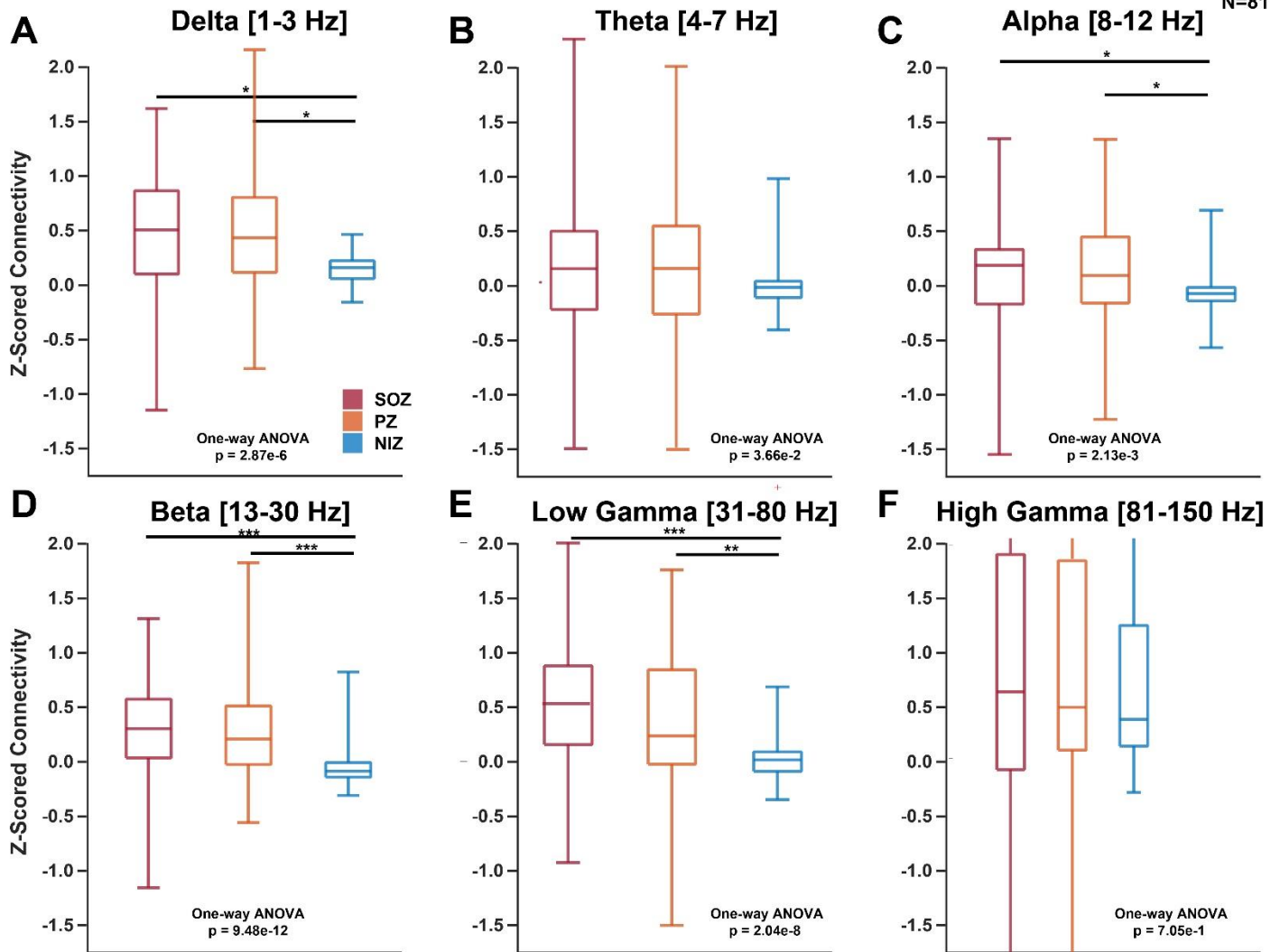
Supplementary Table 2: Mean Euclidean distance between bipolar pairs (i.e. edges) within SOZ, PZ, and NIZ

	Intra-SOZ Distance, mm (mean ± std)	Intra-PZ Distance, mm (mean ± std)	Intra-NIZ Distance, mm (mean ± std)
Cohort			
Full Cohort (N = 81)	20.2 ± 12.5	23.9 ± 15.3	51.4 ± 9.2
SPES Cohort (N = 23)	20.5 ± 12.5	18.6 ± 13.6	50.1 ± 9.3
DWI Cohort (N = 26)	19.1 ± 11.3	20.1 ± 13.2	53.0 ± 7.7
Clinically presumed epilepsy subtype			
Unilateral mesial temporal lobe epilepsy (N = 28)	11.8 ± 6.8	18.1 ± 12.0	52.0 ± 7.9
Bilateral mesial temporal lobe epilepsy (N = 12)	33.6 ± 4.9	33.0 ± 16.6	58.3 ± 4.9
Unilateral lateral temporal lobe epilepsy (N = 10)	13.2 ± 6.0	19.7 ± 17.1	46.8 ± 9.4
Unilateral frontal lobe epilepsy (N = 11)	11.0 ± 7.7	26.9 ± 11.2	43.5 ± 8.6
Unilateral parietal lobe epilepsy (N = 4)	19.9 ± 5.3	7.8 ± 1.2	63.1 ± 9.5
Multiple presumed foci (not bilateral mTLE, N = 16)	34.5 ± 8.4	28.1 ± 16.2	50.2 ± 8.6

mTLE = mesial temporal lobe epilepsy; SOZ = seizure onset zone; PZ = early propagation zone; NIZ = non-involved zone; SPES = single-pulse electrical stimulation; DWI = diffusion-weighted imaging

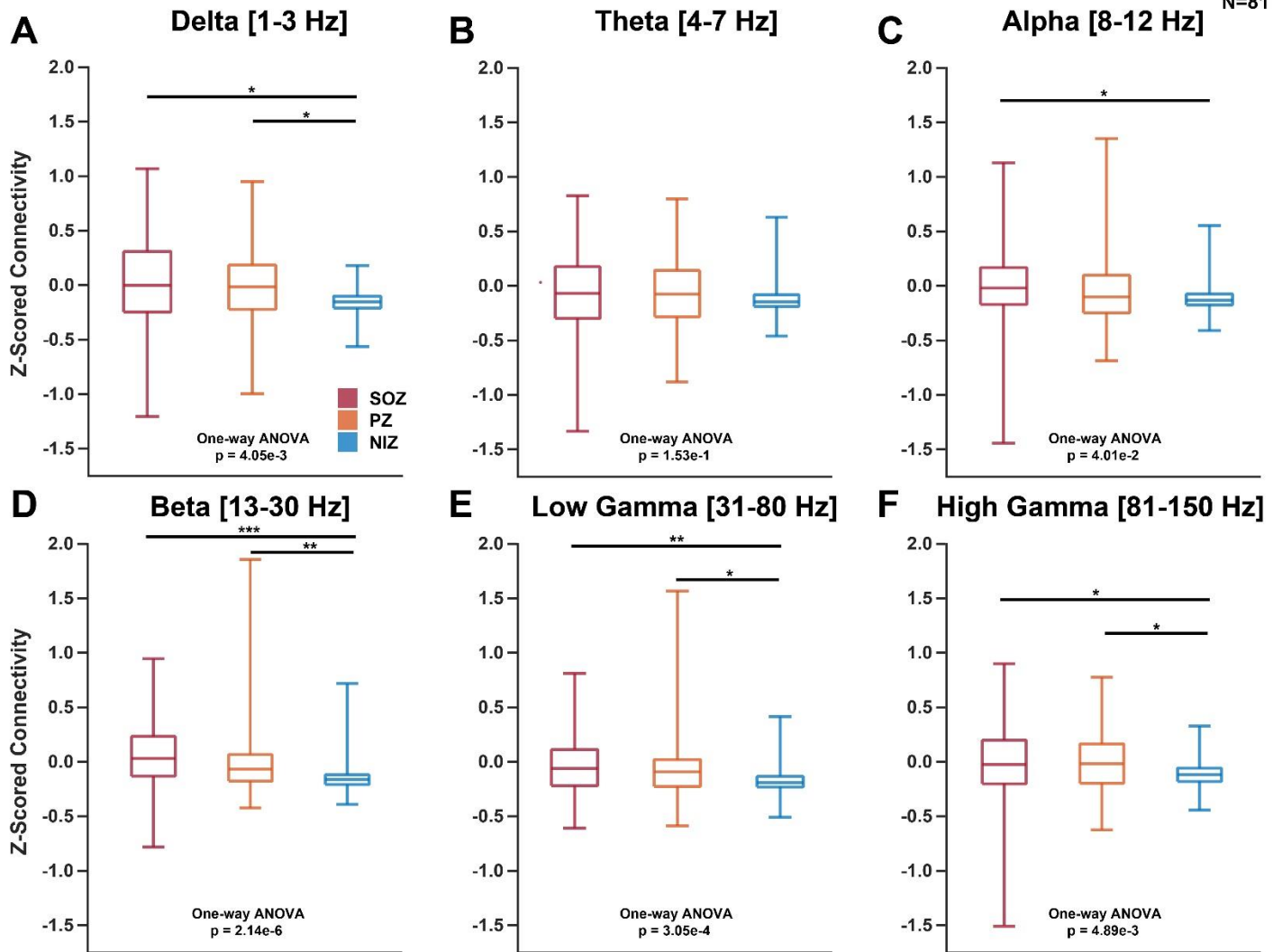
Imaginary Coherence: Whole-Band Resting-State Functional Connectivity

N=81



Supplemental Figure 1: Imaginary coherence over all frequency bands. One-way ANOVA omnibus test with post-hoc pairwise t-tests with Tukey-Kramer multiple comparison correction. * $p < 5e-2$, ** $p < 5e-3$, *** $p < 5e-6$. N=81 subjects.

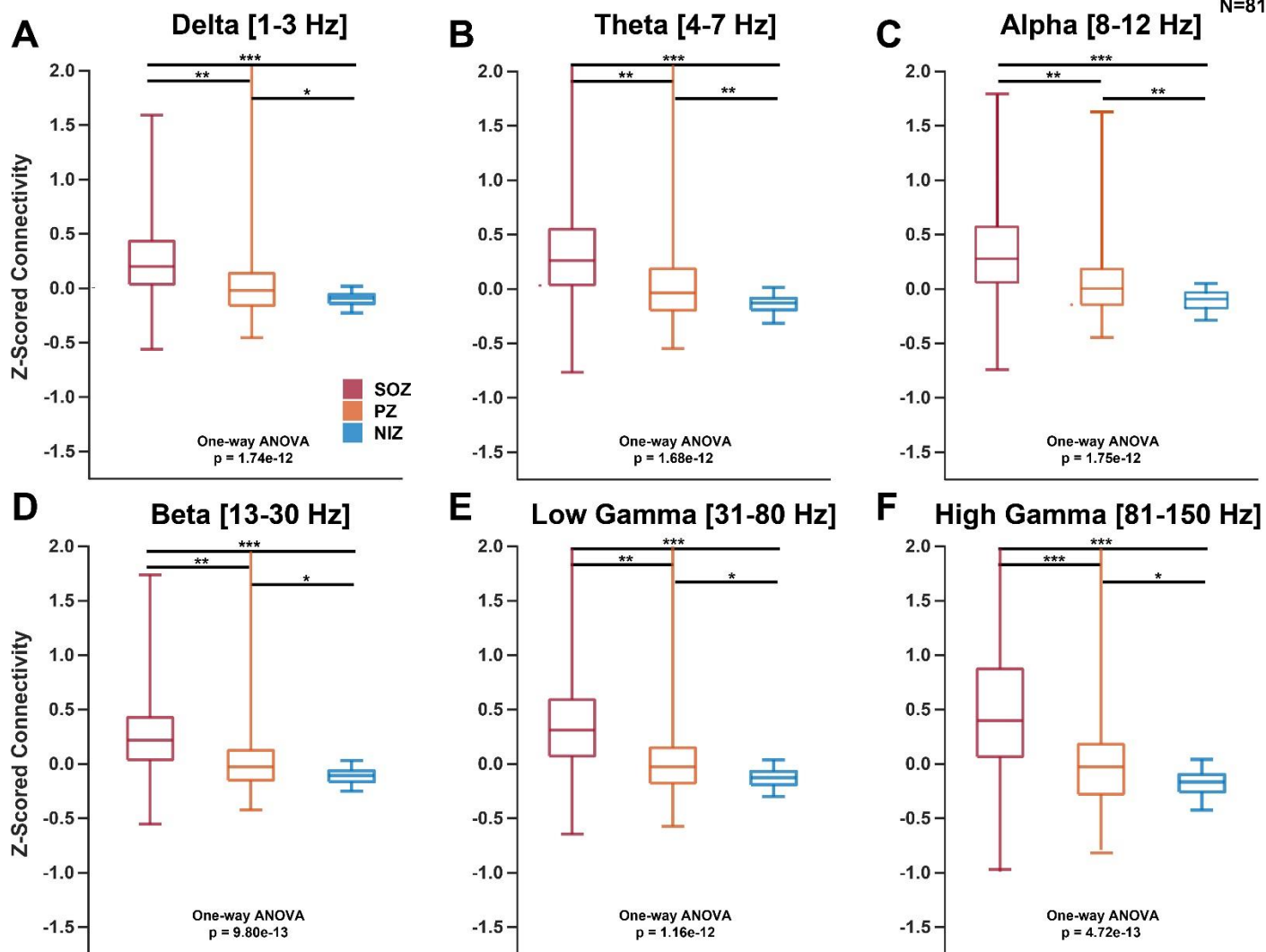
Real Coherence: Whole-Band Resting-State Functional Connectivity ^{N=81}



Supplemental Figure 2: Real coherence over all frequency bands. One-way ANOVA omnibus test with post-hoc pairwise t-tests with Tukey-Kramer multiple comparison correction. * $p < 5e-2$, ** $p < 5e-3$, *** $p < 5e-6$. N=81 subjects.

PDC Inward: Whole-Band Resting-State Functional Connectivity

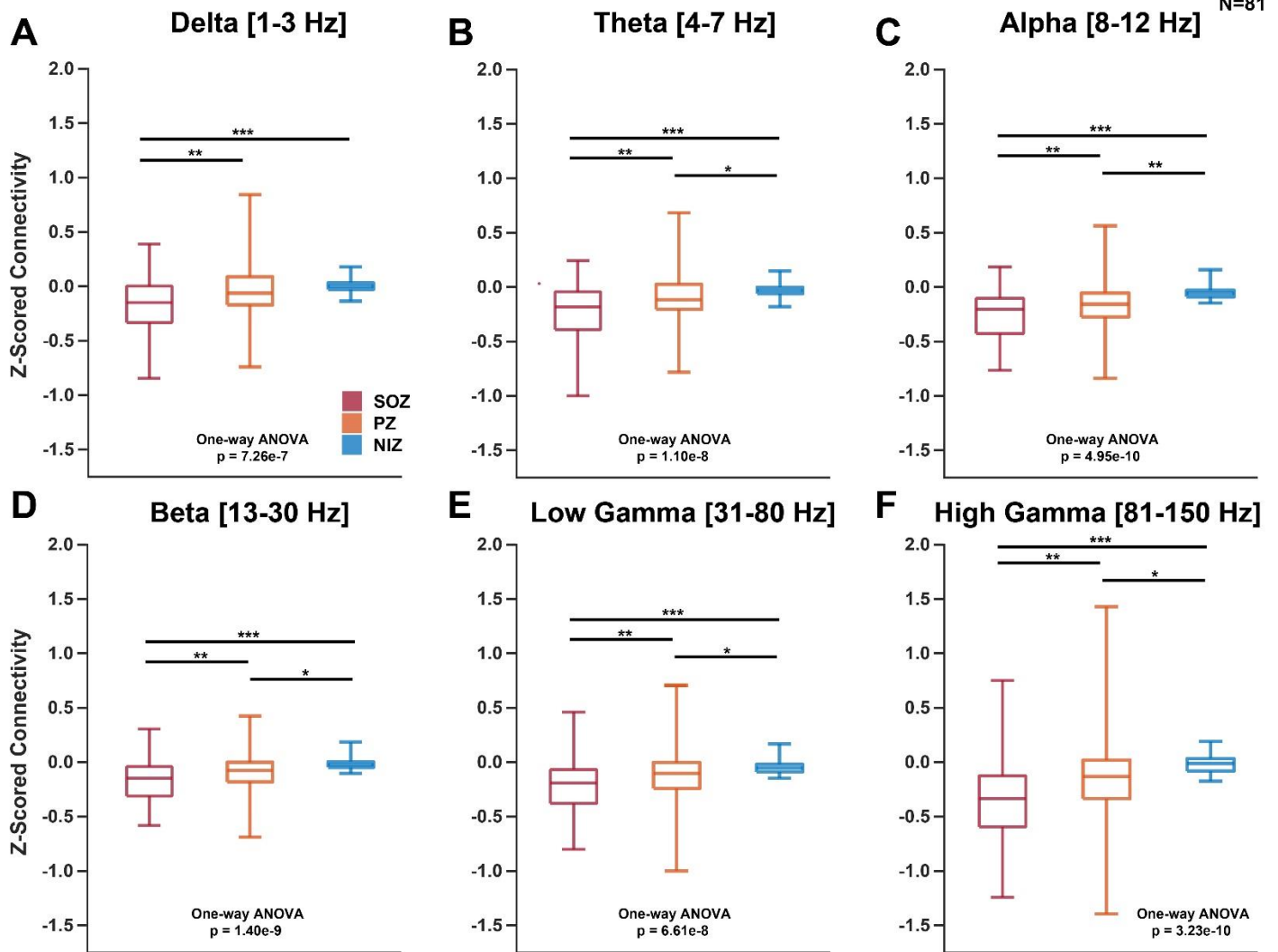
N=81



Supplemental Figure 3: Inward strength of partial directed coherence over all frequency bands. One-way ANOVA omnibus test with post-hoc pairwise t-tests with Tukey-Kramer multiple comparison correction. * $p < 5e-2$, ** $p < 5e-3$, *** $p < 5e-6$. N=81 subjects.

PDC Outward: Whole-Band Resting-State Functional Connectivity

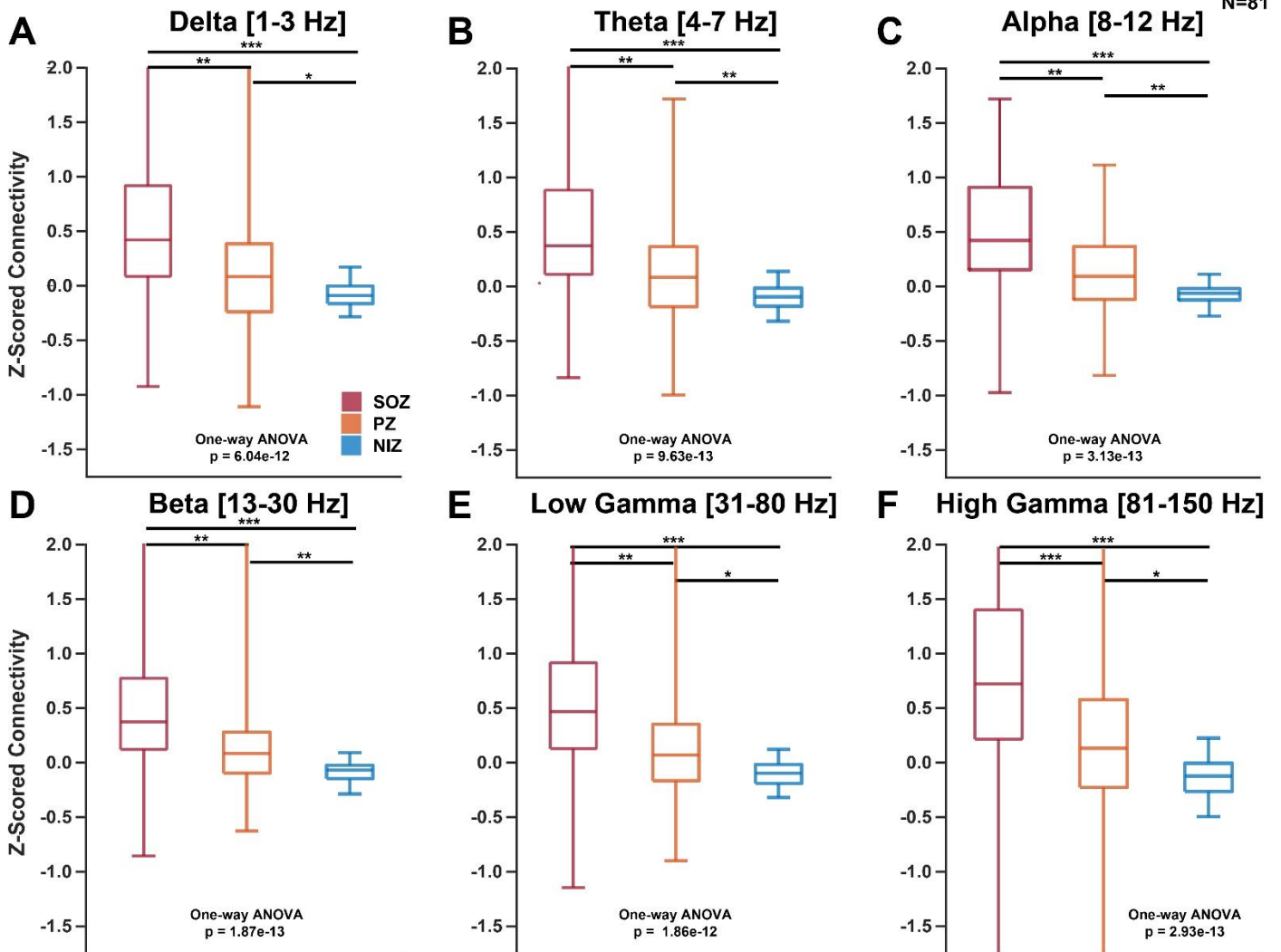
N=81



Supplemental Figure 4: Outward strength of partial directed coherence over all frequency bands. One-way ANOVA omnibus test with post-hoc pairwise t-tests with Tukey-Kramer multiple comparison correction. * $p < 5 \times 10^{-2}$, ** $p < 5 \times 10^{-3}$, *** $p < 5 \times 10^{-6}$. N=81 subjects.

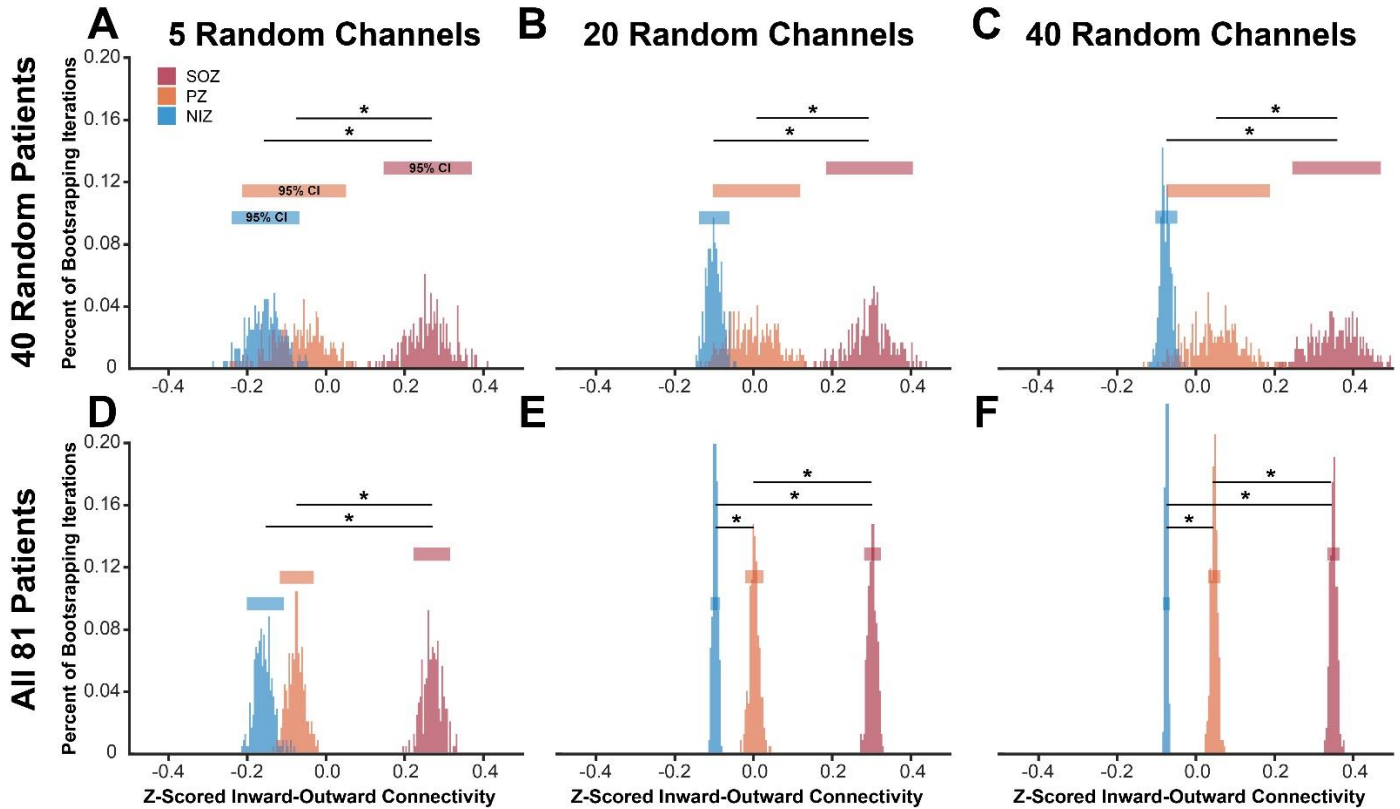
PDC Inward-Outward: Whole-Band Resting-State Functional Connectivity

N=81



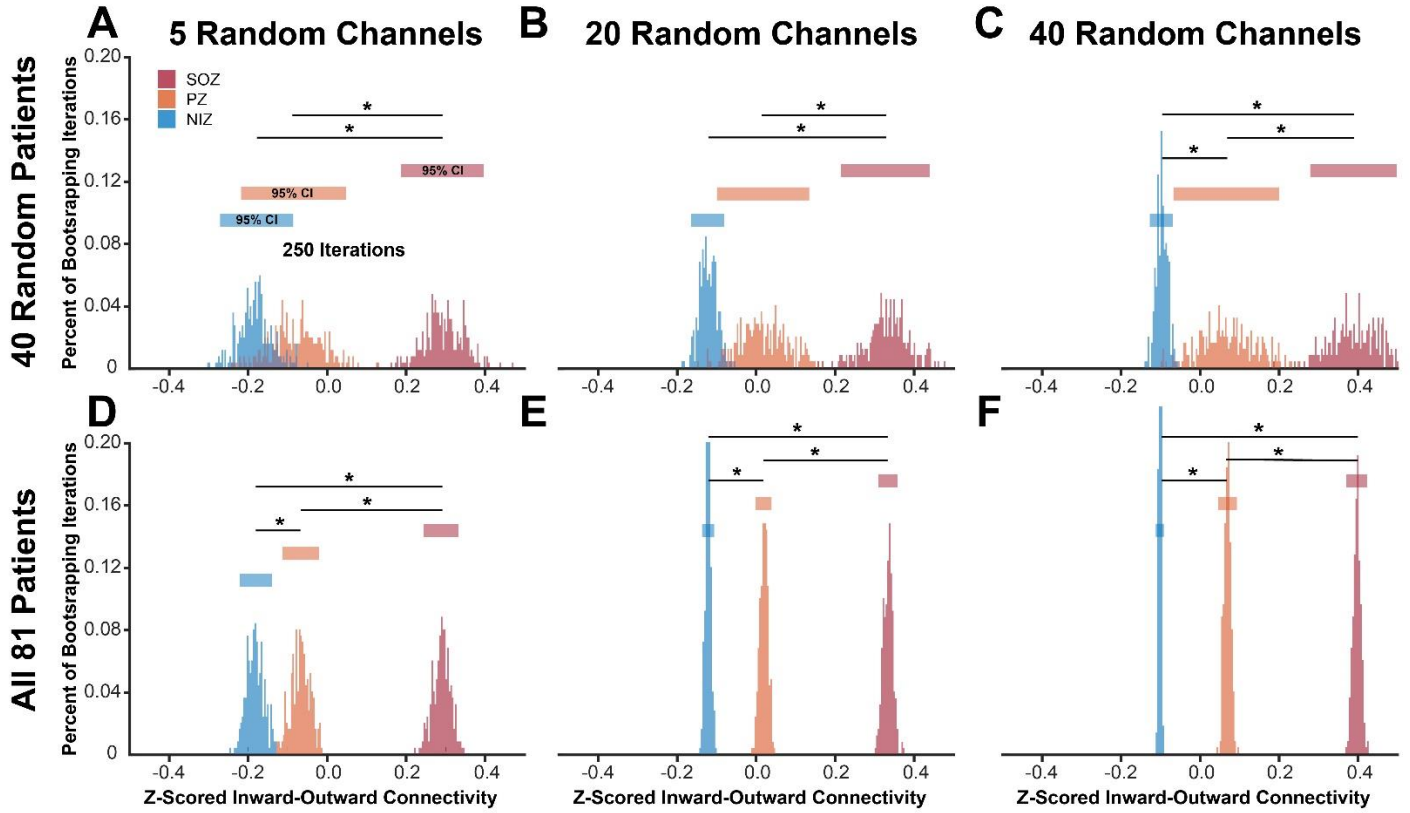
Supplemental Figure 5: Inward-outward strength of partial directed coherence over all frequency bands. One-way ANOVA omnibus test with post-hoc pairwise t-tests with Tukey-Kramer multiple comparison correction. * $p < 5e-2$, ** $p < 5e-3$, *** $p < 5e-6$. N=81 subjects.

Delta (1-3 Hz): Resting-State Bootstrapping



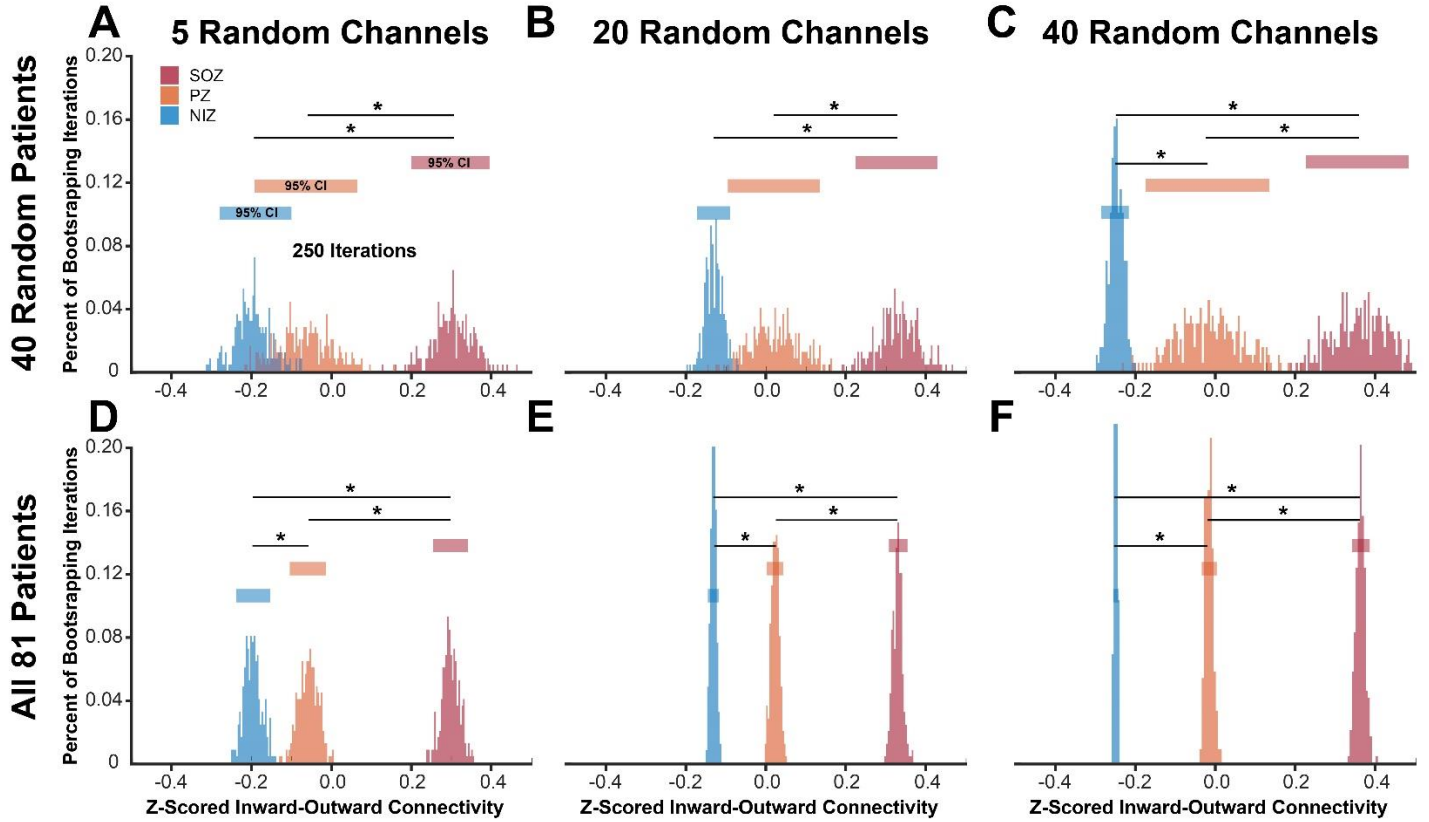
Supplemental Figure 6: Bootstrapping analysis for resting-state delta band [1-3 Hz] analyses. Each plot A-F represents a separate bootstrapping run with 250 iterations each. **A)** Each iteration randomly selected 40 patients, then randomly selected up to 5 SOZ/PZ/NIZ SEEG channels from each patient. **B)** Each iteration randomly selected 40 patients, then randomly selected up to 20 SOZ/PZ/NIZ SEEG channels from each patient. **C)** Each iteration randomly selected 40 patients, then randomly selected up to 40 SOZ/PZ/NIZ SEEG channels from each patient. **D)** Each iteration used all 81 patients, then randomly selected up to 5 SOZ/PZ/NIZ SEEG channels from each patient. **E)** Each iteration used all 81 patients, then randomly selected up to 20 SOZ/PZ/NIZ SEEG channels from each patient. **F)** Each iteration used all 81 patients, then randomly selected up to 40 SOZ/PZ/NIZ SEEG channels from each patient. The histograms represent prevalence of the mean connectivity values across the 250 iterations. 95% confidence intervals are represented by color bars above the histograms.

Theta (4-7 Hz): Resting-State Bootstrapping



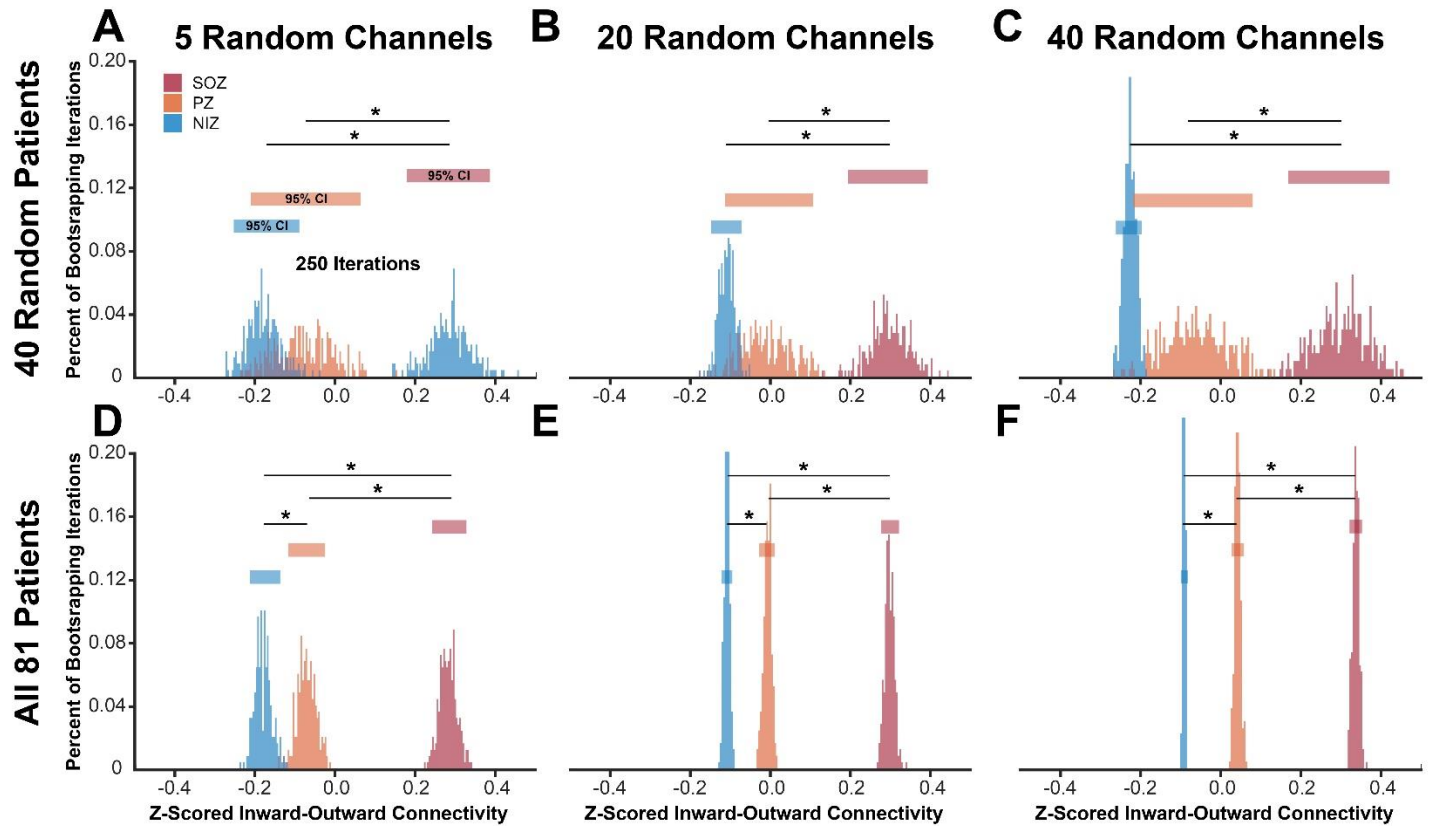
Supplemental Figure 7: Bootstrapping analysis for resting-state theta band [4-7 Hz] analyses. Refer to Supplementary Figure 6 for full description.

Alpha (8-12 Hz): Resting-State Bootstrapping



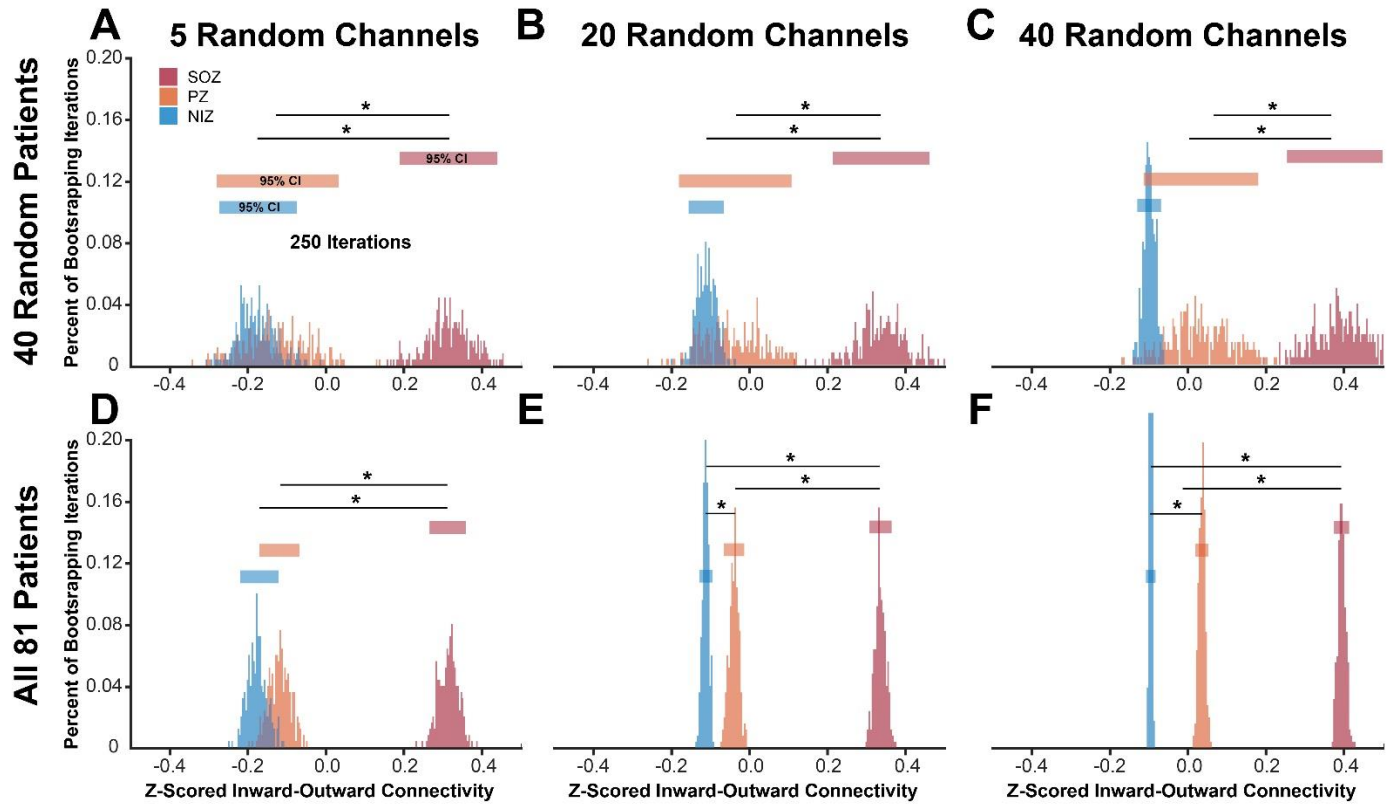
Supplemental Figure 8: Bootstrapping analysis for resting-state alpha band [8-12 Hz]. analyses. Refer to Supplementary Figure 6 for full description.

Beta (13-30 Hz): Resting-State Bootstrapping



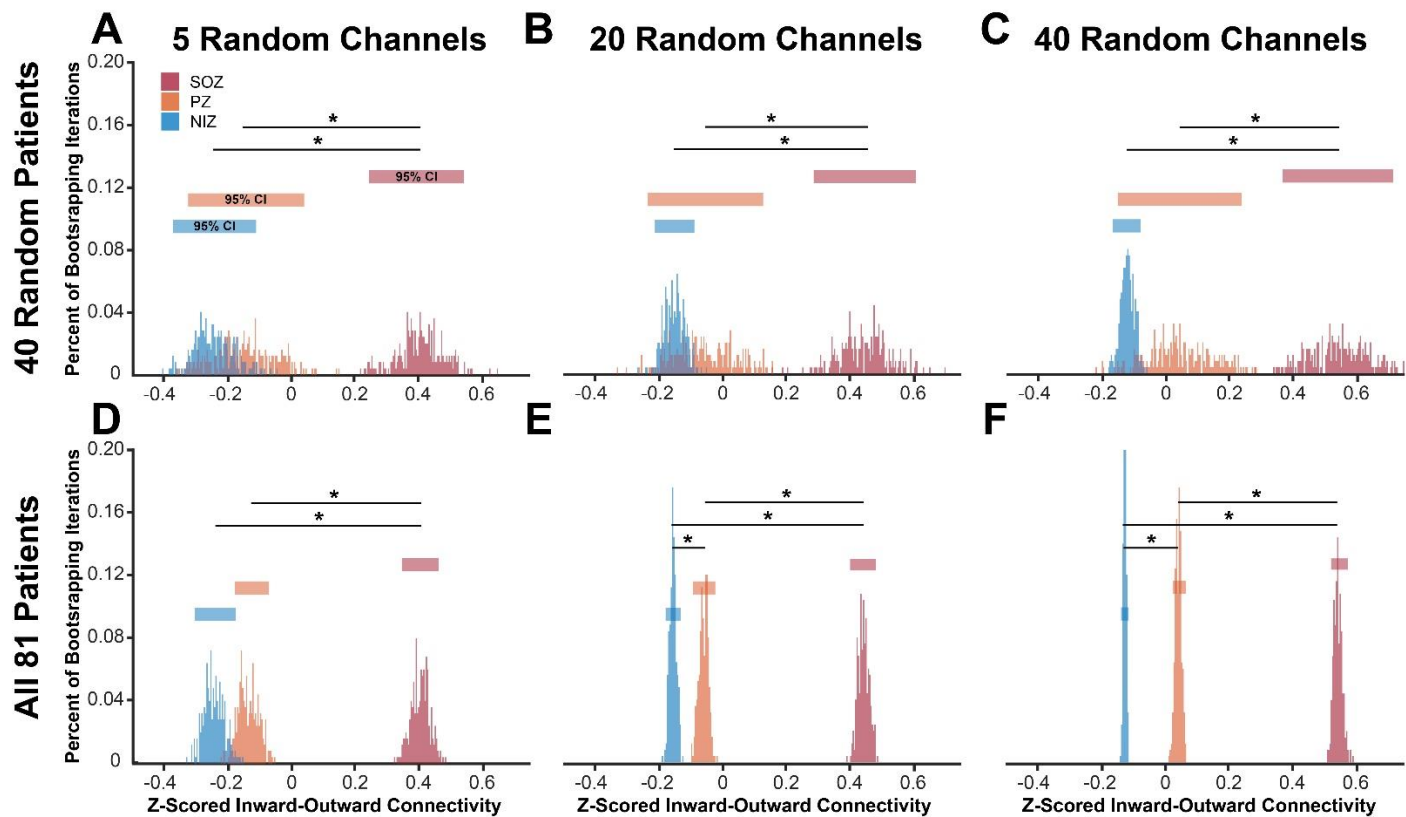
Supplemental Figure 9: Bootstrapping analysis for resting-state beta band [13-30 Hz] analyses. Refer to Supplementary Figure 6 for full description.

Low Gamma (31-80 Hz): Resting-State Bootstrapping



Supplemental Figure 10: Bootstrapping analysis for resting-state low-gamma band [31-80 Hz] analyses. Refer to Supplementary Figure 6 for full description.

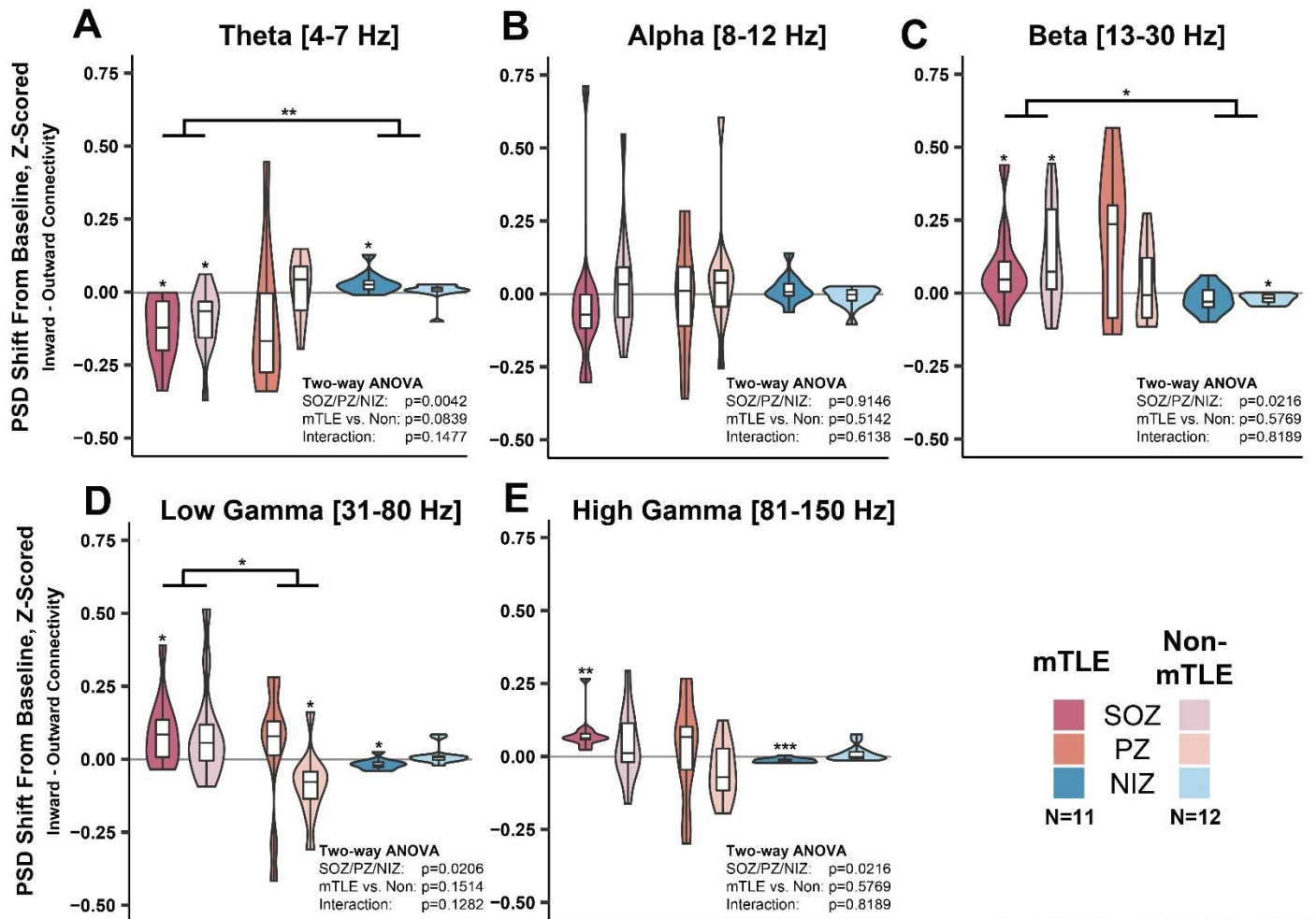
High Gamma (81-150 Hz): Resting-State Bootstrapping



Supplemental Figure 11: Bootstrapping analysis for resting-state high-gamma band [81-150 Hz] analyses. Refer to Supplementary Figure 6 for full description.

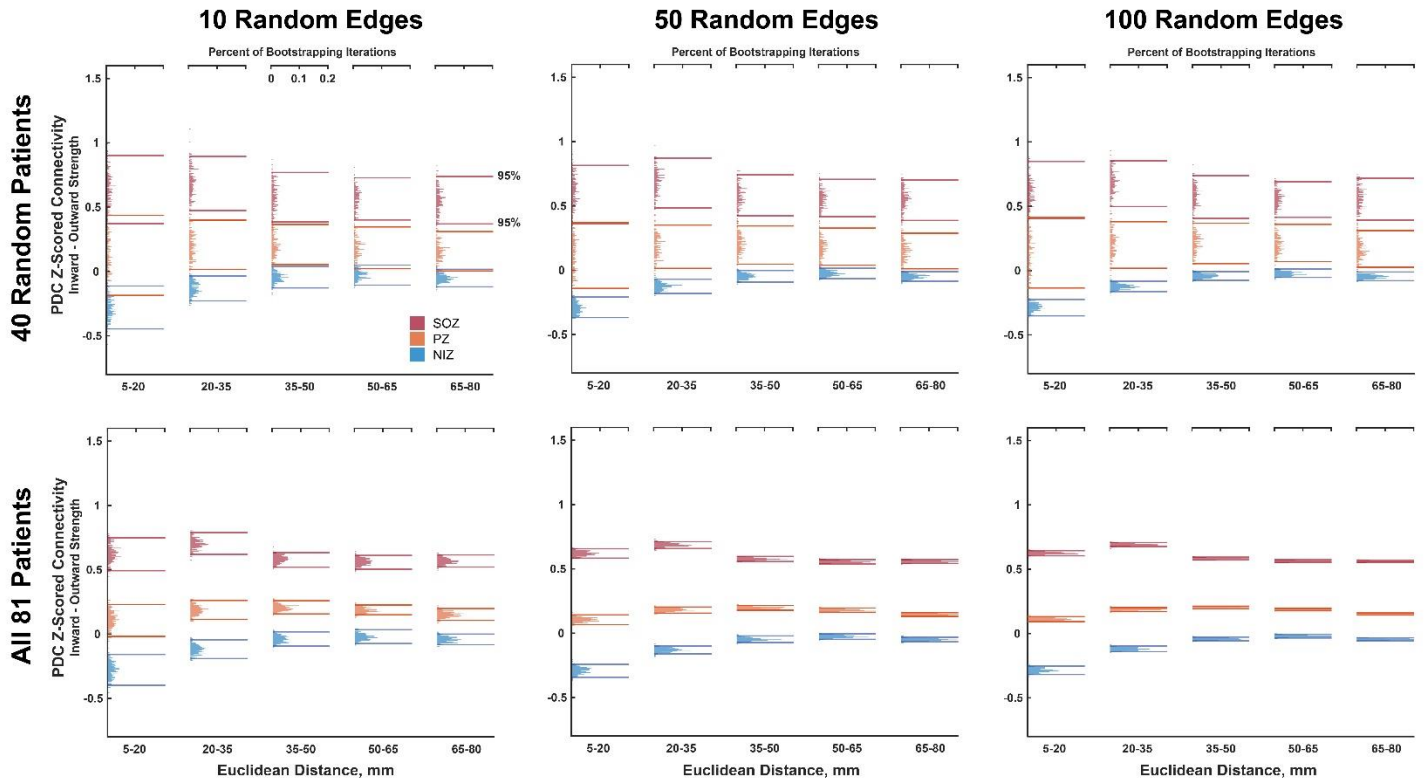
Single-Pulse Stimulation Connectivity: mTLE vs. Non-mTLE

N=23



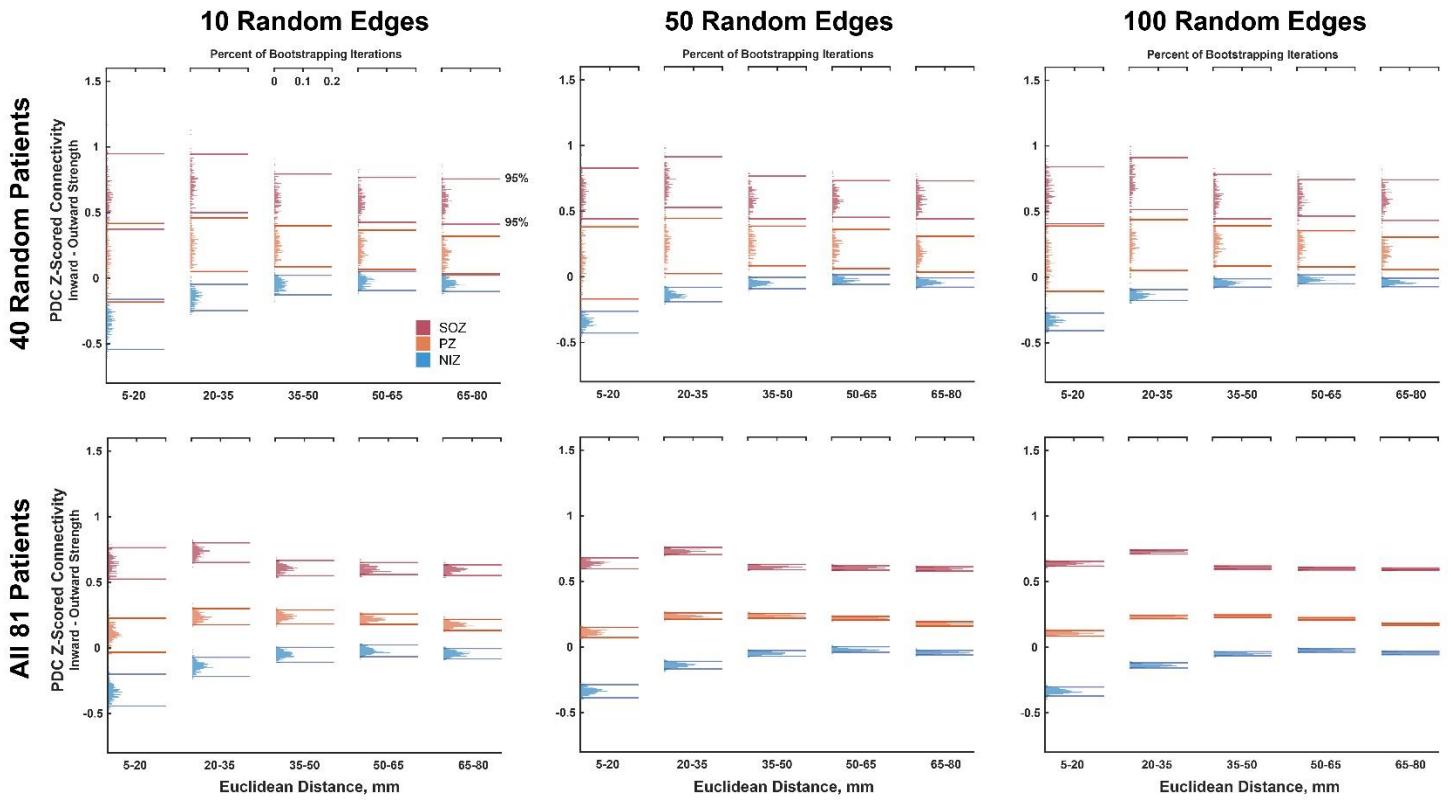
Supplemental Figure 12: SPES analyses separated by mTLE and non-mTLE. This figure depicts the same data as Figure 3, however patients with mTLE and non-mTLE have been segregated and a two-way ANOVA has been run to detect group differences ($p > 0.05$ for all bands).

Delta (1-3 Hz): Resting-State by Distance Bootstrapping



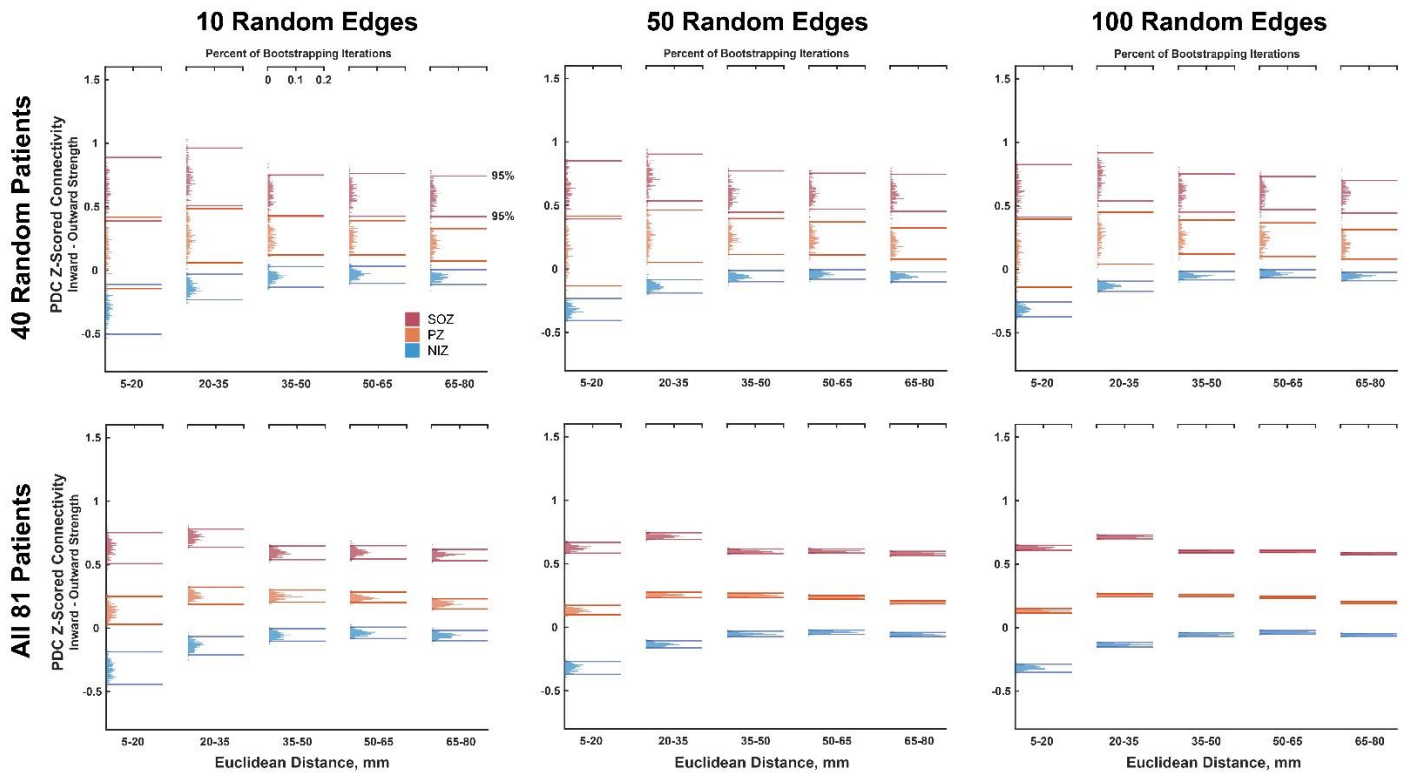
Supplemental Figure 13: Bootstrapping analysis over distance for resting-state delta band [1-3 Hz] analyses. Each plot A-F represents a separate bootstrapping run with 250 iterations each. **A)** Each iteration randomly selected 40 patients, then randomly selected 10 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. **B)** Each iteration randomly selected 40 patients, then randomly selected 50 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. **C)** Each iteration randomly selected 40 patients, then randomly selected 100 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. **D)** Each iteration used all 81 patients, then randomly selected 10 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. **E)** Each iteration used all 81 patients, then randomly selected 50 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. **F)** Each iteration used all 81 patients, then randomly selected 100 edges per distance bin for SOZ/PZ/NIZ SEEG nodes from each patient. The histograms represent prevalence of the mean connectivity values across the 250 iterations. 95% confidence intervals are represented by horizontal color lines.

Theta (4-7 Hz): Resting-State by Distance Bootstrapping



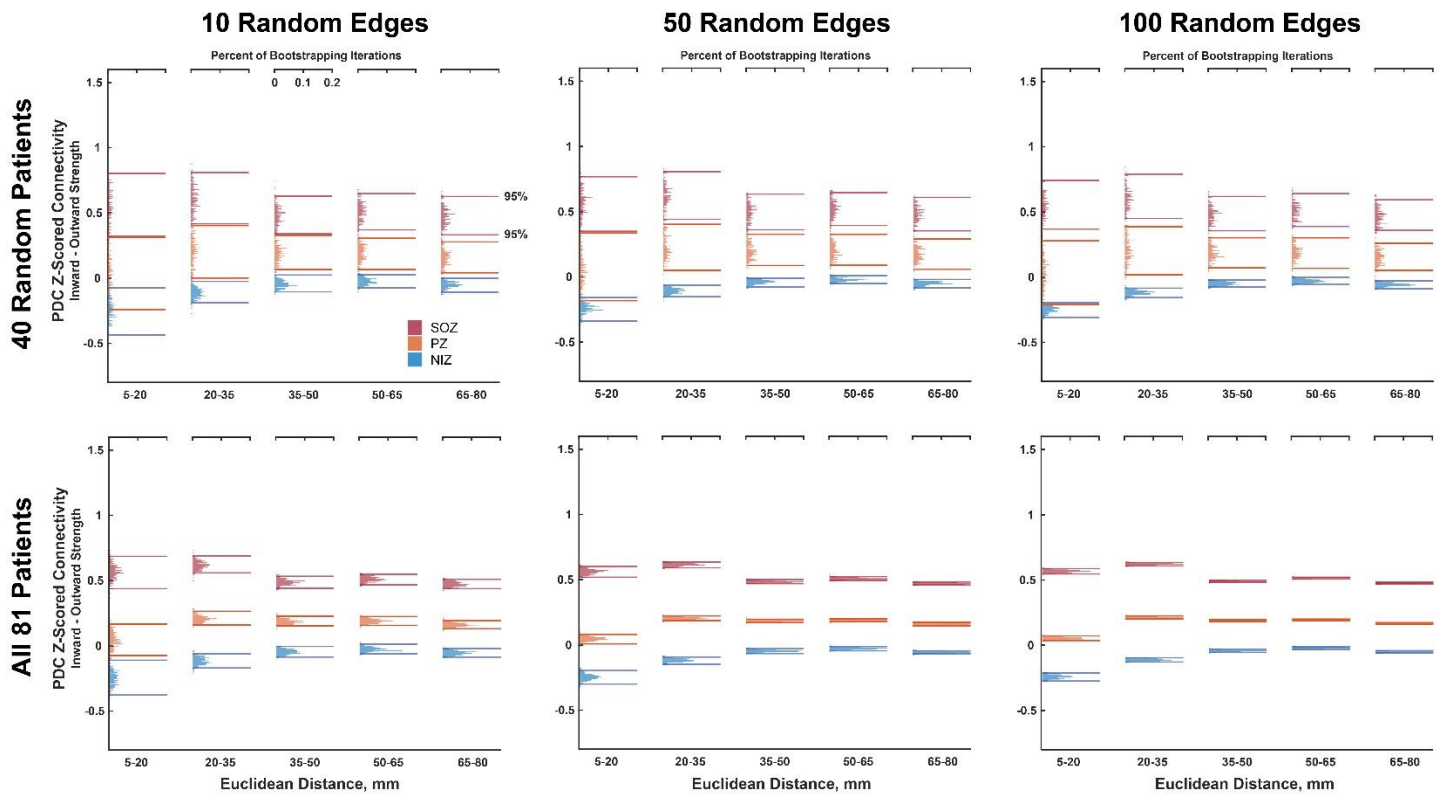
Supplemental Figure 14: Bootstrapping analysis over distance for resting-state theta band [4-7 Hz] analyses. Please refer to Supplementary Figure 13 for a full description.

Alpha (8-12 Hz): Resting-State by Distance Bootstrapping



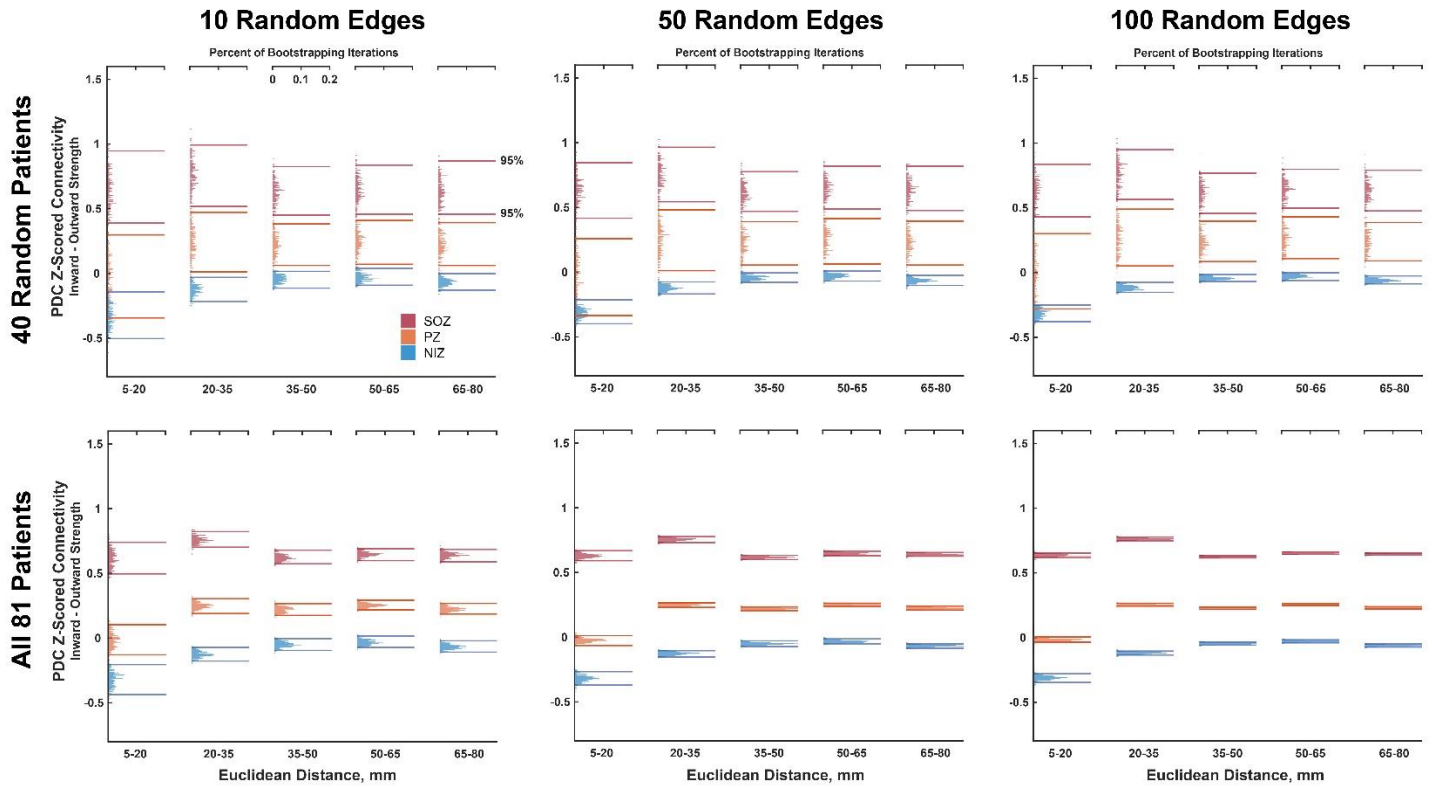
Supplemental Figure 15: Bootstrapping analysis over distance for resting-state alpha band [8-12 Hz] analyses. Please refer to Supplementary Figure 13 for a full description.

Beta (13-30 Hz): Resting-State by Distance Bootstrapping



Supplemental Figure 16: Bootstrapping analysis over distance for resting-state beta band [13-30 Hz] analyses. Please refer to Supplementary Figure 13 for a full description.

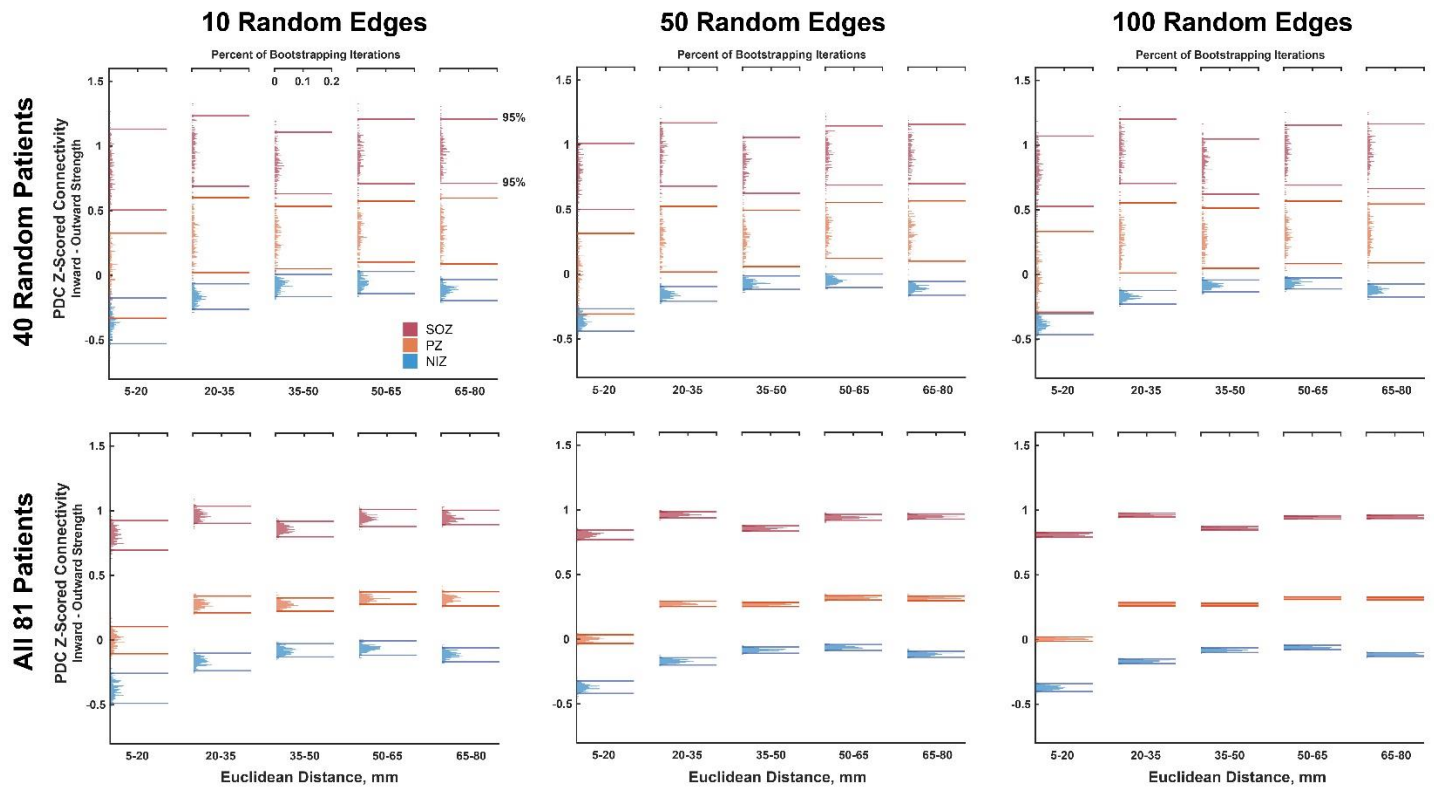
Low Gamma (31-80 Hz): Resting-State by Distance Boot-



Supplemental Figure 17: Bootstrapping analysis over distance for resting-state low-gamma band [31-80-7 Hz] analyses.

Please refer to Supplementary Figure 13 for a full description.

High Gamma (81-150 Hz): Resting-State by Distance Bootstrapping



Supplemental Figure 18: Bootstrapping analysis over distance for resting-state high-gamma band [81-150 Hz] analyses.

Please refer to Supplementary Figure 13 for a full description.